# A Novel and Optimized Parallel Approach for ETL Using Pipelining

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*Abstract* – Companies have huge amounts of precious data lying around throughout their servers and networks that needs to be moved from one location to another such as from one business center to another or to a data warehouse for analysis. The problem is that the data lies in different sorts of heterogeneous systems, and therefore in different formats. To accumulate data at one place and to make it suitable for strategic decisions we need a data warehouse system. This consists of extract, transform and load (ETL) software, which extracts data from various resources, transform it into new data formats according to required information needs, and then load it into desired data structure(s) such as a data warehouse. Such softwares take enormous time for the purpose which makes the process very slow. To deal with the problem of time taken by ETL process, in this paper we are presenting a new technique of ETL using pipelining. We have divided the ETL process into various segments which work simultaneously using pipelining and reduce the time for ETL considerably.

*Keywords* — Data Warehouse, Data Mining, Data Mart, pipelining, nested pipelining, parallel computing.

## I. INTRODUCTION

In today's world businesses demand softwares to process large data volumes at the lightning speeds. Everybody wants to have information and reports on a single click. In this fast changing competitive environment data volumes are increasing exponentially and hence there is an increasing demand on the data warehouses to deliver available information instantly. Additionally, data warehouses should generate consistent and accurate results.[1] In data warehouse, data is extracted from operational databases, ERP applications, CRM tools, excel spread sheets, flat files etc. It then transformed to match the data warehouse schema and business requirements and loaded into the data warehouse database in desired structures. Data in the Data warehouse is added periodically – monthly, daily, hourly depending on the purpose of the data warehouse and the type of business it serves.[2]

Because ETL is a continuous and frequent part of a data warehouse process, ETL processes must be automated and a well-designed. An ETL system is necessary for the accomplishment of a data warehousing project. ETL is the process that involves Extraction, Transformation and Loading.

## II. EXTRACTION

The first part of an ETL process is to extract the data from various source systems. Most data warehousing projects consolidate data from different sources. These systems may use a different data organization and format. Common data source formats are relational databases and flat files, but may include non-relational database structures such as IMS or other data structures such as VSAM or ISAM. To improve the quality of data during the extraction process, two operations are performed:

- ✓ Data profiling.
- ✓ Data cleaning.

### A. Data Profiling

**Data profiling** is the process of examining the data available in an existing data source (e.g. a database or a file) and collecting statistics and information about that data [11]. The purpose of data profiling is to identify the relationships between columns, check for integrity constraints and also check for ambiguities, incomplete or incorrect values in data . Data profiling therefore enables to eliminate errors due to these reasons.

After this, the process of data cleaning is executed in which we perform the following tasks:

- ✓ Filling up the missing values.
- ✓ Smooth noisy data.
- ✓ Identify or remove outliers.
- ✓ Resolve inconsistency.
- ✓ Resolve redundancy caused by integration.

### B. Data Cleaning

Scrubbing or Data Cleansing is removing or correcting errors and inconsistencies present in operational data values (e.g., inconsistently spelled names, impossible

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